



# Spectral Gamma-Ray Borehole Log Data Report

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Borehole

# 21-10-11

Log Event A

## Borehole Information

Farm : <u>BX</u>	Tank : <u>BX-110</u>	Site Number : <u>299-E33-170</u>
N-Coord : <u>45,431</u>	W-Coord : <u>53,581</u>	TOC Elevation : <u>656.40</u>
Water Level, ft :	Date Drilled : <u>9/30/1971</u>	

## Casing Record

Type : <u>Steel-welded</u>	Thickness : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>100</u>	

## Borehole Notes:

Borehole 21-10-11 was drilled in September 1971 to a depth of 100 ft. The borehole was completed with 6-in. casing at a depth of 100 ft. The casing thickness is presumed to be 0.280 in., on the basis of the published thickness for schedule-40, 6-in. steel pipe, which was typically used as casing during the early 1970s drilling campaign. Although no information concerning grouting or perforations is provided, it is assumed that the borehole was not grouted or perforated since this was not a routine practice during the early 1970s drilling campaign. The top of the casing, which is the zero reference for the SGLS, is approximately 0.5 ft below the ground surface. While preparing the borehole for logging contamination was detected at an unknown depth on the inside of the casing; therefore, the current depth of the borehole was not measured.

## Equipment Information

Logging System : <u>2</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>04/1997</u>	Calibration Reference : <u>GJO-HAN-14</u>	Logging Procedure : <u>P-GJPO-1783</u>

## Log Run Information

Log Run Number : <u>1</u>	Log Run Date : <u>07/29/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>0.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>63.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

Log Run Number : <u>2</u>	Log Run Date : <u>07/30/1997</u>	Logging Engineer: <u>Bob Spatz</u>
Start Depth, ft.: <u>62.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>99.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>



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## Analysis Information

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Analyst : H.D. Mac Lean

Data Processing Reference : MAC-VZCP 1.7.9

Analysis Date : 01/12/1998

### Analysis Notes :

This borehole was logged by the SGLS in two logging runs. A centralizer was used during all logging runs. The pre- and post-survey field verification spectra for all logging runs met the acceptance criteria established for the peak shape and detector efficiency, confirming that the SGLS was operating within specifications. The energy calibration and peak-shape calibration from the pre- or post-survey field verification spectrum that most closely matched the logging run data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra acquired during a particular logging run. There was negligible gain drift during the logging runs; it was not necessary to adjust the established channel-to-energy parameters to maintain proper peak identification.

Casing correction factors for a 0.280-in.-thick steel casing were applied during analysis.

The only man-made radionuclide detected in this borehole log was Cs-137. The contaminant occurs continuously from the ground surface to a depth of 8 ft and continuously from 14 to 24 ft. Cs-137 contamination was also detected at a depth of 34 ft. The Cs-137 concentrations from the ground surface to 8 ft ranged from just over 1 pCi/g within the first 1 ft of the ground surface to about 0.2 pCi/g (just above the MDL) at a depth of 8 ft. The measured Cs-137 concentrations from 14 to 24 ft ranged from 0.2 to 0.3 pCi/g. The measured Cs-137 concentration at 34 ft was 0.2 pCi/g (just above the MDL).

The logs of the naturally occurring radionuclides show that the K-40 concentrations increase at 45 ft from a background of about 8 pCi/g above this depth to a background of 16 to 17 pCi/g below this depth. The K-40 concentrations decrease to a background of about 15 pCi/g below the 70-ft depth and remain at this level to the bottom of the logged interval (99 ft).

An analysis of the shape factors associated with the logging spectra was not performed. The concentrations of man-made radionuclides, such as Cs-137, were not sufficiently high to permit a meaningful shape factor analysis. Additional information and interpretations of log data are included in the main body of the Tank Summary Data Report for tank BX-110.

### Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.